Synopsis of Mini Project (KCA353)
On

Crop Yielding Prediction App

MCA-II year/ III Semester

Submitted by

Pankaj Bora	2101640140076
Sagar Verma	2101640140096
Swati Srivastava	2101640140121
Shivangi Tiwari	2101640140106
Shanawar Hasan	2101640140100

Under the Supervision of

Mr. Sumit Chandra

Head of Department (MCA)

PRANVEER SINGH INSTITUTE OF TECHNOLOGY

PSIT
Kanpur

To the

Dr. A.P.J. Abdul Kalam Technical University, Lucknow

Session: 2022-2023

Table Of Contents

Abstract

Earlier, crop cultivation was undertaken on the basis of farmers' hands-on expertise. However, climate change has begun to affect crop yields badly. Consequently, farmers are unable to choose the right crop/s based on soil and environmental factors, and the process of manually predicting the choice of the right crop/s of land has, more often than not, resulted in failure. Accurate crop prediction results in increased crop production. This is where machine learning playing a crucial role in the area of crop prediction. Crop prediction depends on the soil, geographic and climatic attributes. Selecting appropriate attributes for the right crop/s is an intrinsic part of the prediction undertaken by feature selection techniques. In this work, a comparative study of various wrapper feature selection methods are carried out for crop prediction using classification techniques that suggest the suitable crop/s for land.

Introduction

Agriculture in India is a livelihood for a majority of the population and can never be underestimated as it employs more than 50% of the Indian workforce and contributed 1718% to the country's GDP. Indian agriculture is characterized by Agroecological diversities in soil, rainfall, temperature, and cropping system. Monitoring crop growth and yield estimation are very important for the economic development of a nation. Many uncertain conditions such as climate changes, fluctuations in the market, flooding, etc. cause problems to the agricultural process. Technology can help farmers to produce more with the help of crop yield prediction.

Most of our Agricultural development programs in our country are mainly concentrated on providing resources and support after crop yields, there are no precautionary plans to make sure crop yields are obtained to full potential and plan crop cultivation. Nowadays, climate changes are predicted by the weather prediction system broadcasted to the people, but, in real-life scenarios, many farmers are unaware of this information. Crop yield estimation can be used to help farmers to reduce the loss of production under unsuitable conditions and increase production under suitable and favorable conditions It also plays an essential role in decision- making at global, regional, and field levels

In this research web-based application is built in which crop recommendation, yield prediction, are introduced. This helps the farmers to make better management and economic decisions in growing crops.

Project Scope

Agriculture plays a significant role in the economic sector. The automation in Agriculture is the main concern and the emerging subject across the world.
The continuous population has increased the demand for food and employment. The traditional methods used by the farmers were not sufficient enough to fulfill these requirements. Thus, new automated methods were introduced. These new methods satisfied the food requirements and also provided employment opportunities to billions of people.

.

Aims And Objective

The objective of crop recommender systems is to provide recommendations based on recorded information on the users' preferences.

These systems use information filtering techniques to process information and provide the user with potentially more relevant items.

The major and serious setback in the crop productivity is that the farmers do not choose the right crop for cultivation.

The ensembling technique is used to build a model that combines the predictions of multiple

models together to recommend the right crop based on the soil specific type and characteristics with high accuracy.

The crop recommendation system classifies the input soil dataset into the recommendable crop type, Kharif and Rabi.

The dataset comprises of the soil specific physical and chemical characteristics in addition to the

climatic conditions such as average rainfall and the surface temperature samples.

The average classification accuracy obtained by combining the independent base learners is 99.91%

Tools and Technology

Technology

- Machine learning
- IOT sensors
- Flutter

Language

- Python – version – 3.9 (Backend / Machine learning)
- Dart (For building mobile app)

Major Libraries,

- Matplotlib
- Seaborn
- NumPy
- Scikit Learn
- Pandas (Classification and reading Data)

Tools / Softwares

- Jupyter Notebook (For training model and classification)
- VScode (Source Code)

Modules Description

Our project has currently three modules, all three are briefly described below.

1. **Backend Module:** This module is responsible for all requests of the end user. This module includes:
    - Fetching Soil information through the IOT sensors
    - Triggering ML module
    - Display Output to the user

2. **Feature Extraction:** This module takes the dataset and classify the training data set into vectors. This module includes:
    - Model training

3. **Recommendation Module:** Our Application will recommend the best possible crop that can be yield in particular environment which will maximize the profitability.

4. **Hardware Module:** IOT sensors will be used to get the information of the soil.

Methodology

Frontend:

Using Flutter, we will build our app

- Display Predicted Crop on Realtime

Backend:

Data Acquisition: Three different types of data were gathered. The Dataset used for the experiment in this research is originally collected from the Kaggle repository and data.gov.in

- Data for crop Prediction
- This dataset helps to build a predictive model to recommend the most suitable crops to grow on a particular farm based on various parameters.
- This dataset was built by augmenting datasets of rainfall, climate, and fertilizer data available for India. Data fields:

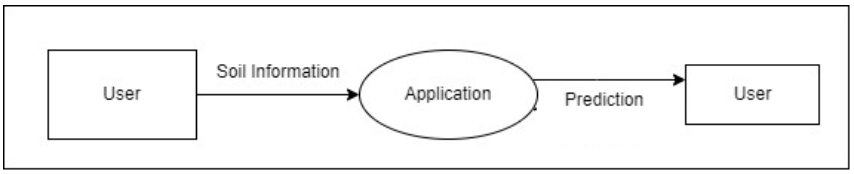
1. N – the ratio of Nitrogen content in soil
2. P – the ratio of Phosphorous content in the soil
3. K – the ratio of Potassium content in soil
4. temperature – the temperature in degrees Celsius
5. humidity – relative humidity in %
6. pH – pH value of the soil
7. rainfall – rainfall in mm

Above data will be used to predict the crop which can be yielded by the farmer

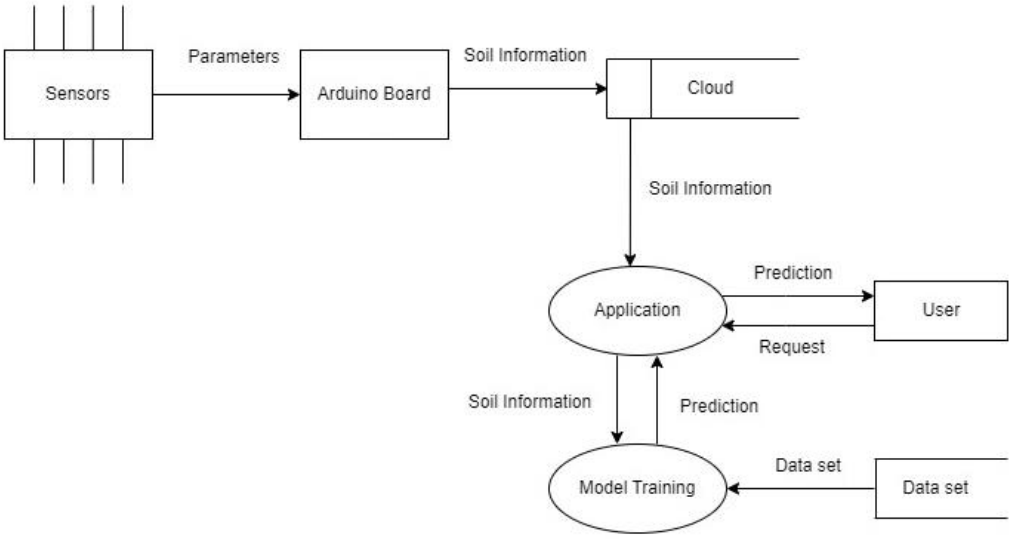
Data Flow Diagram (DFD)

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination. Data flowcharts can range from simple, even hand-drawn process overviews, to in-depth, multi-level DFDs that dig progressively deeper into how the data is handled.

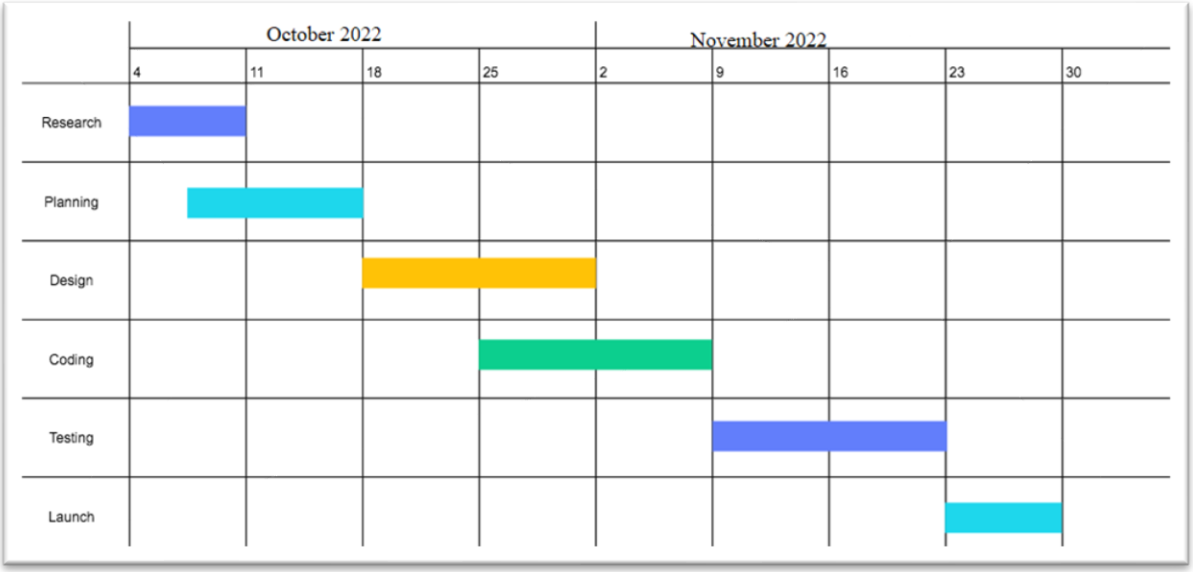
LEVEL 0 DFD:



LEVEL 1 DFD:



Expected Time Schedule



IMPACT OF PROPOSED SYSTEM

Predicting productivity of crop in various climatic conditions can help farmer and other partners in essential basic leadership as far as agronomy and product decision. This model can be used to select the most excellent crops for the region and also its yield thereby improving the values and gain of farming also.

ROLES

Backend/Model Training and Prediction: -

- Pankaj Bora

Hardware Acquisition:

- Shivangi Tiwari
- Sagar Verma

Front-End Development: -

- Shanawar Hasan
- Swati Srivastava
- Sagar Verma

PROS AND CONS

Pros: -

- Compact and High Mobility
- It provides better planning and decision making to increase production

Cons: -

- Soil Information is necessary
- User cold-start problem- The system cannot produce predict when there is not enough information of soil.

REFERENCES

[1] Thomas van Klompenburga, Ayalew Kassahuna, Cagatay Catalb Crop yield prediction using machine learning: A systematic literature review Computers and Electronics in Agriculture 177, 2020 Elsevier, DOI: 10.1016/j.compag.2020.105709.

[2] D. K, R. M, S. V, P. N, and I. A. Jayaraj, Meta- Learning Based Adaptive Crop Price Prediction for Agriculture Application, in 2021 IEEE, 5th International Conference on Electronics, Communication, and Aerospace Technology (ICECA), 2021, pp. 396-402, DOI: 10.1109/ICECA52323.2021.9675891

[3] P. S. Nishant, P. Sai Venkat, B. L. Avinash, and B. Jabber, Crop Yield Prediction based on Indian Agriculture using Machine Learning, 2020 International Conference for Emerging Technology (INCET), 2020, pp. 1-4, DOI: 10.1109/INCET49848.2020.915403

[4] Y. J. N. Kumar, V. Spandana, V. S. Vaishnavi, K. Neha, and V. G.

CONCLUSION

The prediction of crop cultivation is critical to agriculture, with farmers keen to work out how much they can possibly expect to produce. In the past, cultivar prediction was carried out by taking into account farmers' basic understanding of specific stretches of land and the crops to be grown therein. This research has focused on comparing the feature selection methods of different prediction models, and suggested the best method to forecast crop cultivation in the future. Our findings from the results obtained conclusively show that Boruta, SFFS, and RFE feature selection techniques with the bagging classifier performing best with 10-fold and 70% – 30% data splitting range and RFE with the bagging method, outperforms other methods.